AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application. Please amend Claims 26, 46, and 50 and cancel Claims 39 and 41.

Listing of Claims

1-25. (Cancelled).

26. (Currently amended) A composition of matter comprising a contact product of at least one solid mixed oxide compound, ~~and at least one of:~~ at least one organometal compound, and at least one organoaluminum compound, ~~or a combination thereof;~~

wherein the organometal compound has the following general formula

$(X^1)(X^2)(X^3)(X^4)M^1$, wherein

M^1 is selected from titanium, zirconium, or hafnium;

(X^1) is a cyclopentadienyl, an indenyl, a fluorenyl, a substituted cyclopentadienyl, a substituted indenyl, or a substituted fluorenyl;

(X^3) and (X^4) are independently a halide, an aliphatic group, a cyclic group, a combination of aliphatic and cyclic groups, or an organometallic group;

(X^2) is a cyclopentadienyl, an indenyl, a flourenyl, a substituted cyclopentadienyl, a substituted indenyl, a substituted fluorenyl, a halide, an aliphatic group, a cyclic group, a combination of aliphatic and cyclic groups, or an organometallic group;

(X^1) and (X^2) are optionally joined by an aliphatic bridging group, a cyclic bridging group, a combination of aliphatic and cyclic bridging groups, or an organometallic bridging group; and

the substituents on the substituted cyclopentadienyls, substituted indenyls and substituted fluorenyls are independently an aliphatic group, a cyclic group, a combination of aliphatic and cyclic groups, an organometallic group, or hydrogen;

wherein the organoaluminum compound has the following general formula

$$AL(X^5)_n(X^6)_{3-n}, \text{ wherein}$$

(X^5) is a hydrocarbyl having from 1-20 carbon atoms;

(X^6) is a halide, hydride, or alkoxide; and

"n" is a number from 1 to 3 inclusive;

wherein the solid mixed oxide compound comprises a mixed oxide of at least two elements of group 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15 of the periodic table, including lanthanides and actinides; and

wherein there is a substantial absence of aluminoxanes and borate compounds.

27. (Previously presented) The composition of matter of Claim 26, wherein the composition is characterized by an ethylene polymerization activity of greater than 150 gP/(gS·hr) when measured under slurry polymerization conditions, using isobutane as a diluent, at a polymerization temperature of about 90°C, and at an ethylene pressure of about 550 psig.

28. (Previously presented) The composition of matter of Claim 26, wherein the composition is characterized by an ethylene polymerization activity of greater than 200 gP/(gS·hr) when measured under slurry polymerization conditions, using isobutane as a diluent, at a polymerization temperature of about 90°C, and at an ethylene pressure of about 550 psig.

29. (Previously presented) The composition of matter of Claim 26, wherein the composition is characterized by an ethylene polymerization activity of greater than 250 gP/(gS·hr) when measured under slurry polymerization conditions, using isobutane as a diluent, at a polymerization temperature of about 90°C, and at an ethylene pressure of about 550 psig.

30. (Previously presented) The composition of matter of Claim 26, wherein the composition is characterized by an ethylene polymerization activity of greater than 300 gP/(gS·hr) when measured under slurry polymerization conditions, using isobutane as a diluent, at a polymerization temperature of about 90°C, and at an ethylene pressure of about 550 psig.

31. (Previously presented) The composition of matter of Claim 26, wherein the organometal compound is:

bis(cyclopentadienyl)hafnium dichloride;

bis(cyclopentadienyl)zirconium dichloride;

[ethyl(indenyl)$_2$]hafnium dichloride;

[ethyl(indenyl)$_2$]zirconium dichloride;

[ethyl(tetrahydroindenyl)$_2$]hafnium dichloride;

[ethyl(tetrahydroindenyl)$_2$]zirconium dichloride;

bis(n-butylcyclopentadienyl)hafnium dichloride;

bis(n-butylcyclopentadienyl)zirconium dichloride;

((dimethyl)(diindenyl)silane)zirconium dichloride;

((dimethyl)(diindenyl)silane)hafnium dichloride;

((dimethyl)(ditetrahydroindenyl)silane)zirconium dichloride;

((dimethyl)(di(2-methyl indenyl)silane)zirconium dichloride;

bis(fluorenyl)zirconium dichloride; or

any combination thereof.

32. (Previously presented) The composition of matter of Claim 26, wherein the organoaluminum compound is:

trimethylaluminum;

triethylaluminum;

tripropylaluminum;

diethylaluminum ethoxide;

tributylaluminum;

triisobutylaluminum hydride;

triisobutylaluminum;

diethylaluminum chloride; or

any combination thereof.

33. (Previously presented) The composition of matter of Claim 26, wherein the solid mixed oxide compound comprises a mixed oxide of at least two of Al_2O_3, B_2O_3, BeO, Bi_2O_3, CdO, Co_3O_4, Cr_2O_3. CuO, Fe_2O_3, Ga_2O_3, La_2O_3, Mn_2O_3, MoO_3, NiO, P_2O_5, Sb_2O_5, SiO_2, SnO_2, SrO, ThO_2, TiO_2, V_2O_5, WO_3, Y_2O_3, ZnO, or ZrO_2.

34. (Previously presented) The composition of matter of Claim 26, wherein the solid mixed oxide compound comprises a mixed oxide of at least two elements from Al, B, Be, Bi, Cd, Co, Cr, Cu, Fe, Ga, La, Mn, Mo, Ni, Sb, Si, Sn, Sr, Th, Ti, V, W, P, Y, Zn, or Zr.

35. (Previously presented) The composition of matter of Claim 26, wherein the solid mixed oxide compound comprises a mixed oxide of zirconium, boron, and aluminum.

36. (Previously presented) The composition of matter of Claim 26, wherein the solid mixed oxide compound is calcined from about 300°C to about 900°C from about 1 minute to about 100 hours.

37. (Previously presented) The composition of matter of Claim 26, wherein the solid mixed oxide compound is calcined from about 500°C to about 700°C from about 1 hour to about 10 hours.

38. (Cancelled)

39. (Cancelled)

40. (Previously presented) The composition of matter of Claim 26, wherein the composition is characterized by a substantial absence of organochromium compounds or $MgCl_2$.

41. (Cancelled)

42. (Previously presented) The composition of matter of Claim 26, wherein the solid mixed oxide compound is from about 10 to about 1000 microns in size.

43. (Previously presented) The composition of matter of Claim 26, wherein the solid mixed oxide compound has a pore volume greater than about 0.01 cc/g.

44. (Previously presented) The composition of matter of Claim 26, wherein the solid mixed oxide compound has a surface area great than about 1 m^2/g.

45. (Previously presented) The composition of matter of Claim 26, wherein the organometal compound comprises bis(n-butylcyclopentadienyl)zirconium dichloride, the organoaluminum compound comprises triethylaluminum, and the solid mixed oxide compound comprises a mixed oxide of zirconium, boron, and aluminum.

46. (Currently amended) A composition of matter consisting essentially of a contact product of at least one solid mixed oxide compound; ~~and at least one of:~~ at least one organometal compound; and at least one organoaluminum compound; ~~or a combination thereof;~~

wherein the organometal compound has the following general formula

$$(X^1)(X^2)(X^3)(X^4)M^1, \text{ wherein}$$

M^1 is selected from titanium, zirconium, or hafnium;

(X^1) is a cyclopentadienyl, an indenyl, a fluorenyl, a substituted cyclopentadienyl, a substituted indenyl, or a substituted fluorenyl;

(X^3) and (X^4) are independently a halide, an aliphatic group, a cyclic group, a combination of aliphatic and cyclic groups, or an organometallic group;

(X^2) is a cyclopentadienyl, an indenyl, a flourenyl, a substituted cyclopentadienyl, a substituted indenyl, a substituted fluorenyl, a halide, an aliphatic

group, a cyclic group, a combination of aliphatic and cyclic groups, or an organometallic group;

(X^1) and (X^2) are optionally joined by an aliphatic bridging group, a cyclic bridging group, a combination of aliphatic and cyclic bridging groups, or an organometallic bridging group; and

the substituents on the substituted cyclopentadienyls, substituted indenyls and substituted fluorenyls are independently an aliphatic group, a cyclic group, a combination of aliphatic and cyclic groups, an organometallic group, or hydrogen;

wherein the organoaluminum compound has the following general formula

$$AL(X^5)_n(X^6)_{3-n}, \text{ wherein}$$

(X^5) is a hydrocarbyl having from 1-20 carbon atoms;

(X^6) is a halide, hydride, or alkoxide; and

"n" is a number from 1 to 3 inclusive; and

wherein the solid mixed oxide compound comprises a mixed oxide of at least two elements of group 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15 of the periodic table, including lanthanides and actinides.

47. (Previously presented) The composition of matter of Claim 46, wherein the solid mixed oxide compound comprises a mixed oxide of at least two of Al_2O_3, B_2O_3, BeO, Bi_2O_3, CdO, Co_3O_4, Cr_2O_3. CuO, Fe_2O_3, Ga_2O_3, La_2O_3, Mn_2O_3, MoO_3, NiO, P_2O_5, Sb_2O_5, SiO_2, SnO_2, SrO, ThO_2, TiO_2, V_2O_5, WO_3, Y_2O_3, ZnO, or ZrO_2.

48. (Previously presented) The composition of matter of Claim 46, wherein the solid mixed oxide compound comprises a mixed oxide of at least two elements from Al, B, Be, Bi, Cd, Co, Cr, Cu, Fe, Ga, La, Mn, Mo, Ni, Sb, Si, Sn, Sr, Th, Ti, V, W, P, Y, Zn, or Zr.

49. (Previously presented) The composition of matter of Claim 46, wherein the solid mixed oxide compound comprises a mixed oxide of zirconium, boron, and aluminum.

50. (Currently amended) A composition of matter comprising a contact product of at least one solid mixed oxide compound, ~~and at least one of:~~ at least one organometal compound, and at least one organoaluminum compound, ~~or a combination thereof,~~

wherein the organometal compound has the following general formula

$(X^1)(X^2)(X^3)(X^4)M^1$, wherein

M^1 is selected from titanium, zirconium, or hafnium;

(X^1) is a cyclopentadienyl, an indenyl, a fluorenyl, a substituted cyclopentadienyl, a substituted indenyl, or a substituted fluorenyl;

(X^3) and (X^4) are independently a halide, an aliphatic group, a cyclic group, a combination of aliphatic and cyclic groups, or an organometallic group;

(X^2) is a cyclopentadienyl, an indenyl, a flourenyl, a substituted cyclopentadienyl, a substituted indenyl, a substituted fluorenyl, a halide, an aliphatic group, a cyclic group, a combination of aliphatic and cyclic groups, or an organometallic group;

(X^1) and (X^2) are optionally joined by an aliphatic bridging group, a cyclic bridging group, a combination of aliphatic and cyclic bridging groups, or an organometallic bridging group; and

the substituents on the substituted cyclopentadienyls, substituted indenyls and substituted fluorenyls are independently an aliphatic group, a cyclic group, a combination of aliphatic and cyclic groups, an organometallic group, or hydrogen;

wherein the organoaluminum compound has the following general formula

$$AL(X^5)_n(X^6)_{3-n}, \text{ wherein}$$

(X^5) is a hydrocarbyl having from 1-20 carbon atoms;

(X^6) is a halide, hydride, or alkoxide; and

"n" is a number from 1 to 3 inclusive;

wherein the solid mixed oxide compound comprises a mixed oxide of at least two elements of group 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15 of the periodic table, including lanthanides and actinides; and

wherein the composition has an ethylene polymerization activity of greater than 100 gP/(gS·hr) measured under slurry polymerization conditions using isobutane as a diluent, at a polymerization temperature of about 90°C, at an ethylene pressure of

about 550 psig, and in the substantial absence of aluminoxanes and borate compounds.